

Sensory characteristics and putrefaction test of broiler chicken meat dipping in *Syzygium polyanthum* infusion with different storage time

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Abstract. This study aims at evaluating the sensory characteristics and putrefaction testing of broiler chicken meat dipping in *Syzygium polyanthum* infusion with different storage time. Observations were made on sensory quality of raw meat (color and aroma), cooked meat (color, aroma, flavor, and tenderness), and putrefaction testing of the eber test. The study considered two treatments, namely *Syzygium polyanthum* infuse concentrations (0 vs. 15%) during 30 minutes and different storage times at 4°C (0, 2, 4, 6, and 8 days) where each treatment repeated three times. The sensory characteristics test of chicken meat is performed by the panelist method. The collected data were analyzed by analysis of non-parametric with the Kruskal Wallis test. The results of the rot test were analyzed descriptively qualitatively. Data showed that the concentration of *Syzygium polyanthum* infusion and storage time could reduce the color and improve the aroma of raw meat and also tenderness and the smell of cooked meat. The initial rot of control chicken meat and bay leaf on day 4 with positive parameters used the Postma test and control chicken meat using the H₂S test.

1. Introduction

Chicken meat is a food product of animal origin that contains high nutrition so that it can be used as a suitable medium for the growth of microorganisms. Fresh meat also contains enzymes that can break down nutritional components, which eventually cause spoilage. Therefore, meat is categorized as a perishable food [1]. The short shelf life of chicken meat has led to many methods being developed to extend shelf life, such as chemical cooling and preservation [2]. However, to maintain meat resilience, people or business actors often misuse chemicals that are not supposed to be used in the preservation process, one of which is formalin [3]. Some natural preservatives that have an antioxidant and an antimicrobial activity such as clove powder, ginger, garlic, chitosan, oregano oil, green tea, cloudberry, beetroot, willow herb, rosemary, clove, and red chili are useful for maintaining meat quality, extending shelf-life, and preventing economic loss [4].

Another plant that is useful as a preservative is the salam plant (*Syzygium polyanthum*). Bay leaves are known as a natural medicine that functions as antibacterial, anti-fungal, anti-diabetic, and anti-inflammatory [5]. The compounds in bay leaves are essential oils (citril and eugenol), tannins, flavonoids, and triterpenoids. The bioactive compounds in bay leaves can be bactericidal, bacteriostatic, fungicidal, and germinal / inhibit the germinal of bacterial spores [6].

2. Materials and Method

2.1. Materials

The materials used in this study were the breast, bay leaf, aqua dest, 96% alcohol, filter paper, Pb Acetate, MgO, and litmus paper.

2.2. Methods

2.2.1. Sample preparation. Fresh bay leaves were weighed with analytical scales, cut to reduce the size, washed, placed in a pan, and added distilled water according to the desired concentration of infusion, then heated in an infusion pan for 15 minutes 90°C. To make a 15% infusion, it takes 150 g of bay leaves to add water to a volume of 1000 ml. Then the solution is filtered using sterile cloth. The concentrations of the infusion made were 0 and 15%. The material used in this study was 15 samples of chicken breast with a weight of 30 g each (Royan Chicken Processing, Yogyakarta, Indonesia). The chicken meat was divided into five groups with storage time (0, 2, 4, 6, and 8 days). The chicken meat is then soaked in bay leaf boiled water with a 15% concentration with a soaking time of 30 minutes. Chicken meat is stored at 4 ° C with non-vacuum plastic using clear plastic and stored for 0, 2, 4, 6, and 8 days.

2.2.2. Sensory characteristics. Samples to be tested for descriptions are raw and cooked chicken. Cooked chicken used for the test is boiled at 80 ° C for 30 minutes. The sensory characteristics, including the color and aroma for cooked meat and color, aroma, taste, and tenderness for raw meat, were tested using the panelists' scoring method [7].

2.2.3. H₂S decay test. Chicken meat is cut into small pieces and put in a petri dish. The meat is then covered with filter paper, and Pb acetate is dropped on the filter paper. Furthermore, observed whether or not H₂S gas binds to Pb acetate. Positive results are indicated by the presence of black spots on the filter paper [9].

2.2.4. Postma decay test. Meat infusion is made by mixing 1 part meat with ten parts distilled water in the Erlenmeyer, then put it in the stomacher (1 minute). The infusion is then filtered, and the filtrate is taken. One gram of MgO is put into a petri dish. Then 10 ml of the meat infusion filtrate was put into a petri dish, on the inner and outer surface of the petri dish cover, glued red litmus paper moistened with distilled water. The Petri dishes are closed, and the contents are carefully homogenized. The Petri dishes were then heated in a water bath at 50 ° C for 5 minutes, then the litmus paper was observed for color changes. A positive result is indicated by changing the red litmus paper to blue, and a negative result is indicated by no change in the color of the red litmus paper. In comparison, the dubious result is a change in red litmus paper to red-blue [9].

2.2.5. Data analysis. The sensory characteristics data were analyzed using a non-parametric test (Kruskal-Wallis test) [8]. The results of the rot test were analyzed descriptively qualitatively.

3. Result and discussion

Table 1. The average score of color, aroma, flavor, and tenderness of cooked and raw chicken by soaking in bay leaf infusion

Variable	Cooked meat		Raw meat	
	Concentration (%)			
	0	15	0	15
Color ^{ns}	3,64±0,81	3,73±0,70	3,70±0,71 ^a	3,06±0,96 ^b
Aroma	1,88±0,89 ^b	2,78±0,97 ^a	1,97±1,31 ^b	3,42±0,84 ^a
Flavor ^{ns}	3,60±0,91	3,65±0,84	-	-
Tenderness	3,58±0,83 ^b	4,06±0,77 ^a	-	-

a, b: Values on different superscripts on the same line show very significant differences (P <0.01)

Table 2. The mean score of color and aroma of raw chicken meat with storage at 4 ° C

Variable	Storage Time (days)				
	0	2	4	6	8
Color ^{ns}	3,50±0,93	3,46±0,86	3,33±0,80	3,43±0,85	3,20±1,06
Aroma ^{ns}	2,80±1,29	2,60±1,35	2,76±1,38	2,80±1,37	2,53±1,25

ns : non-significant

Table 3. The mean score of color, aroma, flavor, and tenderness of cooked chicken meat with storage at 4 ° C

Variable	Storage Time (days)				
	0	2	4	6	8
Color ^{ns}	3,50±0,93	3,80±0,76	3,80±0,76	3,70±0,59	3,63±0,71
Aroma ^{ns}	2,23±1,07	2,30±1,02	2,30±1,02	2,43±0,97	2,40±1,16
Flavor ^{ns}	3,56±0,72	3,53±0,89	3,83±0,87	3,86±0,86	3,33±0,95
Tenderne ss	3,33±0,88 ^b	3,86±0,86 ^a	4,00±0,83 ^a	4,03±0,71 ^a	3,90±0,75 ^a

a, b: Values on different superscripts on the same line show significant differences (P <0.05)

ns: non-significant

3.1. Color

The results of statistical analysis showed that the immersion treatment in raw chicken meat gave a significant difference (P <0.05) but did not provide a significant difference (P > 0.05) in cooked chicken meat. In contrast, the storage time treatment did not provide a significant difference (P > 0.05) in raw or cooked chicken meat.

The meat with the treatment soaked in bay leaf infusion is darker in color. It may be due to the influence of the bay leaf infusion color, which tends to be brownish-black. It's consistent with Dawson and Acton's findings [10], who reported an effect of dark honey color on meat color. Storage time has no significant effect on the color of the meat because the meat has not been damaged so that the color of the meat still tends to be expected. The color of the meat is influenced by handling and storage conditions [11].

3.2. Aroma

The statistical analysis results showed that immersion had a significant effect ($P < 0.05$) on raw and cooked chicken meat. Meanwhile, storage time did not have a significant effect ($P > 0.05$) on raw and cooked chicken meat.

The aroma score indicates that the chicken has a greeting aroma. It's because the boiling process affects the aroma of the meat. According to Aliani and Farmer's results [12], chemical reactions during boiling produce many volatile chemical substances that give the meat aroma and flavor. Storage at 4 ° C until the 8th day does not have a real effect because it has not been damaged, so it has an unpleasant aroma like rotten meat. Frazier and Westhoff [13] stated that foul odor arises from decay in aerobic and anaerobic conditions. Decay in an aerobic state is characterized by mucus, changes in meat pigment color, changes in fat, flavor, and odor.

3.3. Flavor

The statistical analysis results showed that immersion and storage for different lengths of time did not provide a significant difference ($P > 0.05$) in the taste of chicken. It's because soaking in bay leaf infusion does not affect the volatile substances in the meat. Soeparno [14] states that odor and flavor are primarily determined by water and fat-soluble precursors and the release of volatile substances in meat. Another thing is because only a part of the small molecules released by food (during heating, chewing, and others.) react with the receptors in the mouth or nasal cavity [15].

3.4. Tenderness

The statistical analysis results showed that the immersion in bay leaf infusion gave a significant difference ($P < 0.05$) to the tenderness of chicken meat. Besides, different storage time treatments did not provide a significant difference ($P > 0.05$). The antioxidant content in bay leaves can make the meat fibers lose and cause tenderness. Following the opinion of Young *et al.* [16] that chicken meat soaked in the bay, leaf infusion has a higher water holding capacity, water holding capacity is closely related to the level of meat tenderness, the higher the water holding capacity value, the higher the meat tenderness.

3.5. H₂S and postma test

Table 4. H₂S and Postma test results of chicken meat with the addition of bay leaf infusion and control at different storage times

	Concentration Test (%)	Storage times (days)				
		0	2	4	6	8
H ₂ S	0	-	-	+	+	+
	15	-	-	-	+	+
Postma	0	-	-	+	+	+
	15	-	-	+	+	+

Informations: (-) : negative result, no black dots are formed

(+) : positive result, the presence of black dots on the filter paper

3.5.1. H₂S test. The initial results of rot in control chickens were shown on day four while in chickens immersed in bay leaf infusion on day 6. It indicates that the control chicken meat spoiled earlier. Positive results are indicated by the presence of black dots on the filter paper. The H₂S test is a test to see the H₂S released by the bacteria that invaded the meat. The H₂S released in rotting meat will bind with Pb acetate to Pb sulfite (PbSO₃) and produce brown spots on the filter paper dripped with Pb acetate [17].

3.5.2. *Postma test*. A positive result is indicated by red litmus paper turns blue. It's because several bacteria found in meat can carry out the fermentation process and produce ammonia. The Postma test's basic principle is to detect the release of NH_3 due to the denaturation of meat protein using a paper pH meter indicator. A positive result is indicated by an increase in pH to become more alkaline. Marsidah's results [18] shows that decomposing meat will emit NH_3 gas. Free NH_3 will bind to the MgO reagent and produce NH_4OH . Fresh meat doesn't form NH_4OH because there's no free NH_3 .

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